Exhibit 21

UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

SECURITIES AND EXCHANGE COMMISSION,	))	
	)	
Plaintiff,	)	
	)	
v.	)	**CASE NO. 20 CIV. 10832**
	)	
RIPPLE LABS INC., BRADLEY GARLINGHOUSE, AND CHRISTIAN A. LARSEN,	)))	
	)	
Defendants.	))	

Supplemental Report of M. Laurentius Marais, PhD
May 13, 2022

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Attachment A: Materials Considered

I.   Assignment and Summary of Conclusions

1.   I am the same Laurentius Marais who submitted a rebuttal expert report in this matter on November 12, 2021,[1] which listed my qualifications, billing rate, and materials I had reviewed. In my Rebuttal Report I responded to certain opinions offered by Plaintiff's expert, Dr. ████████.[2] In particular, I concluded that:

> "[I]t would be wrong to interpret Dr. ████ event study as establishing that XRP price movements are essentially a function of Ripple's actions. Instead, the ████ event study cannot prove a causal relationship between Ripple's actions and XRP price movements. And, even if it could do so, the ████ event study documents at best that any dependence of XRP price movements on Ripple-related news accounts for no more than a modest, far from preponderant portion of XRP's Unusual price movements since 2014."[3]

2.   Dr. ████ has submitted a Supplemental Report dated February 28, 2022.[4] Counsel for the Defendants have asked me to review and respond, where appropriate to the ████ Supplemental Report.

3.   Based on my review of the ████ Supplemental Report, I have formed the following opinions:

o   Nothing in Dr. ████'s Supplemental Report provides any reason for me to change any opinion in my Rebuttal Report. The opinions I stated in my Rebuttal Report remain unchanged.

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[1] Expert Report of M. Laurentius Marais, PhD, November 12, 2021 ("Marais Rebuttal Report").

[2] Amended Expert Report of ████████, Ph.D., October 6, 2021 ("████ Opening Report").

[3] Marais Rebuttal Report, ¶ 30.

[4] Supplemental Expert Report of ████████, Ph.D., February 28, 2022 ("████ Supplemental Report").

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o   In order to respond to his supplemental assignment from Plaintiff,[5] Dr. ███ departs from his own initial conceptual framework for statistical inference. Instead, he performs analyses and produces results that amount essentially to the tautology that Unusual trading days are indeed Unusual.[6]

o   Dr. ███'s event study methodology is not designed appropriately to provide a reliable basis for the novel calculations presented in his Supplemental Report; as a consequence, the results of these novel calculations are flawed and uninformative.

4.   I explain the bases for these opinions below. Attachment A lists the materials I considered in reaching the opinions stated in this report.

II.   Dr. ███'s Supplemental Report Contains No Effective Response to My Rebuttal Report, and It Provides No New Insight into XRP Pricing in Relation to Ripple News Events

5.   Concerning my Rebuttal Report, Dr. ███ states that I did not conduct "any independent empirical analysis of XRP price data."[7] In stating this claim, Dr. ███ simply ignored the bulk of my Rebuttal Report, which sets forth an extensive empirical analysis of the relative economic significance of Unusual trading days that *do* and do *not* coincide with the Ripple news events identified by Dr. ███. Dr. ███'s incorrect claim is particularly odd given the *evident* parallel between the novel stated assignment for his Supplemental Report and the empirical analysis in my Rebuttal Report. Specifically, Dr. ███ states that his assignment was "to provide additional quantification of the economic significance of the impact that

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[5] ███ Supplemental Report, ¶ 4: "… I have been asked by the SEC to provide additional quantification of the economic significance of the impact that certain news related to Ripple had on XRP prices."

[6] "Unusual" trading days are defined in ¶ 13 of my Rebuttal Report.

[7] ███ Supplemental Report, ¶ 3.

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certain news related to Ripple had on XRP prices."[8] In fact, I summarize my own extensive analysis of this "economic significance" in § IV of my Rebuttal Report under the heading "The Overwhelming Preponderance of the Cumulative [Financial or Economic] XRP [Investment] Returns Associated with the 'Unusual' Trading Days Dr. ███ Identifies Is Not Associated with the Ripple News Event Days He Identifies."[9] Dr. ███ simply disregarded my prior analysis.

6. Unlike Dr. ███'s novel calculations, the analyses I presented in my Rebuttal Report evaluated the comprehensive economic significance of Unusual XRP returns *generally* in relation to Ripple news events. Out of the profusion of econometric models, estimation approaches, and sets of Ripple news days in the ███ Opening Report,[10] Dr. ███ chose to highlight in his Supplemental Report the exemplar case of a modified subset[11] of his "Select" news days, using his Constant Mean Return model (Model 1) to partition XRP returns into "expected" and "abnormal" components, and assessing statistical significance using his parametric approach at a 5% one-sided level.[12] In fact, in my Rebuttal Report, I presented the results of an analysis of the relative economic importance of Ripple news days on cumulative hypothetical XRP investment returns for precisely this exemplar case (excerpted from the first row and rightmost columns of Table 3 of my Rebuttal Report):

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[8] ███ Supplemental Report, ¶ 4.

[9] Marais Rebuttal Report, p.13.

[10] In total, Dr. ███ analyzed 400 different "configurations" in his Opening Report. Marais Rebuttal Report, ¶ 23.

[11] Although one of the five "Select" news days Dr. ███ removed for his analyses in his Supplemental Report, one, December 21, 2017, is classified by Dr. ███ (model 1, one-sided parametric test) as Unusual, the overall results described in this report continue to hold.

[12] ███ Supplemental Report, ¶¶ 8-9, 12, and fn. 17.

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███ "Select" Categories (i.e., All News Dates)		
"Unusual" Trading Days ...		
Coincident with Ripple News	**No Coincident Ripple News**	**"Regular" Trading Days**
$586.66	$2,939,472	$0.33

The corresponding section of Table 2 of my Rebuttal Report shows the numbers of trading days underlying the calculated results shown in Table 3 (and excerpted above):

███ "Select" Categories (i.e., All News Dates) (Max N=105)		
"Unusual" Trading Days ...		
Coincident with Ripple News	**No Coincident Ripple News**	**"Regular" Trading Days**
24	211	81

7.   The results for all other cases in Dr. ███'s profusion of combinations of sets of Ripple news events, econometric specifications of event study models, and approaches to the assessment of statistical significance are shown in the remainder of Tables 2 and 3 as well as the tables shown in Appendices D and E to my Rebuttal Report. Based on this ensemble of results, I reached the opinion that "any dependence of XRP price movements on Ripple-related news accounts for no more

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than a modest, far from preponderant portion of XRP's Unusual price movements since 2014."[13]

8.   Rather than address my analyses and opinions head-on, or materially add to what my own prior analysis teaches about XRP returns and Ripple event days as identified by Dr. ███, the ███ Supplemental Report presents a suite of calculations that are either irrelevant or consistent with what can be learned from my own Rebuttal Report. I describe Dr. ███'s new calculations in greater detail in the following section, but here I address the two high-level summary opinions that he bases on the empirical analyses described in his Supplemental Report: (i) but for Ripple news, XRP prices "would have rarely exceeded $0.02;" and (ii) XRP investment returns on Ripple news days are greater than those on other days.[14]

9.   In his high-level opinion (i), Dr. ███ unaccountably focuses on a statistic with no obvious relevance to any question I understand to be at issue: the relative frequency of trading days with an XRP closing price above $0.02. He appears to think this question and its answer should be of interest to a reader of his Supplemental Report, but provides no further explanation of why, for example, he focuses on a threshold price level of $0.02 as opposed to, say, $0.002, or any other, equally unprincipled and arbitrary threshold. As I show below, when adjusted for abnormal returns on *non*-Ripple news days in the manner of Dr. ███'s Supplemental Report, the price of XRP would never have exceeded $0.007 (the comparable upper bound for Dr. ███'s analysis of prices is, in fact, $0.328).[15] While none of these specific absolute price levels or relative frequencies has any particular relevance to any question I understand to be at issue, all are consistent with my opinion from my Rebuttal Report that investment returns around Unusual trading days *without* ███-identified Ripple news overwhelmingly outweigh

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[13] Marais Rebuttal Report, ¶ 30.

[14] ███ Supplemental Report, ¶ 10.

[15] ███ Supplemental Report, Figure 5 (top row, maximum value).

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investment returns around Unusual trading days *with* ██-identified Ripple news events. This can be seen by comparing the $586.66 and $2,939,472 figures from the Table 3 excerpt above (supra ¶ 6) under the subtitles "Coincident with Ripple News" and "*No* Coincident Ripple News," respectively.[16]

10.   In his high-level opinion (ii), Dr. ██ focuses on investment returns from a hypothetical investment strategy based on purchasing and holding XRP during the ██-identified Select Ripple news days. Understanding that Dr. ██'s Opening Report documents a degree of association of Ripple news with Unusual trading days, and comparing the $586.66 and $0.33 figures from the Table 3 excerpt above (supra ¶ 6) under the subtitles "Coincident with Ripple News" and "'Regular' Trading Days," respectively, suggest that this hypothetical strategy should yield (somewhat) superior investment returns. This suggestion is what Dr. ██ confirms and states as his high-level opinion (ii). ██ high-level opinion (ii) does not address the vastly greater hypothetical investment return reflected in the $2,939,472 figure from the same Table 3 excerpt above under the subtitle "*No* Coincident Ripple News."

III.   In His Supplemental Report, Dr. ██ Departs from his Original Statistical Methods and "Proves" a Tautology: that Unusual Returns are Indeed Unusual.

11.   In his Opening Report, Dr. ██ attempted to "correlate" the incidence of "Unusual" trading days (days with high positive abnormal XRP returns) with the "Ripple news" trading days he identified.[17] He concludes that his analyses show that Unusual trading days coincide with Ripple news days more often than could be explained by random chance alone. Moreover, Dr. ██ attached causal

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[16] My Rebuttal Report provides a detailed explanation and discussion of analogs of these figures for ██ Model 5. *See* Marais Rebuttal Report, § II.B.

[17] Dr. ██ calls these "Unusual" days "statistically significant." However, as I explained in my Rebuttal Report, it is not appropriate to refer to Dr. ██'s Unusual returns as "statistically significant" because statistical significance has a very precise meaning in statistical science. Dr. ██'s approach does not match that meaning precisely. *See* Marais Rebuttal Report, fn. 13.

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interpretation to his "correlation" results by concluding that he can interpret "[Unusual] abnormal returns following the [news] Days as attributable to those public statements."[18] I explained in my Rebuttal Report why Dr. ███'s results are flawed, and why he cannot interpret his results as indicating that Ripple news caused high abnormal XRP returns.[19] Dr. ███ did not respond to these criticisms.

12.   Instead, in his Supplemental Report Dr. ███ departs from his flawed "correlation" framework and presents calculations that amount to showing that Unusual days are Unusual – a tautology. In essence, his calculations quantify the size of the abnormal returns on Unusual days without linking them to Ripple's actions. Although he focuses on Unusual days that coincide with Ripple news, analogous calculations may be performed based on days not coincident with Ripple news or selected in any number of ad hoc ways from the pool of Unusual days. The common denominator for any and all such exercises is that abnormal returns are analyzed only on Unusual days. That this produces unusual cumulative returns is not surprising, since the Unusual days were selected precisely because, within the context of Dr. ███'s models, they appear to show unusually high returns.

13.   More specifically, Dr. ███ removes the "abnormal" portion of the total return on those days he selected to show that the overall prices are affected.[20] Dr. ███ focuses on only Unusual days coincident with Ripple news he identified and ignores any Unusual days not coincident with Ripple news.

14.   As a thought experiment, Dr. ███ could, for instance, have selected all Wednesdays among the Unusual trading days he identified. As an alternative selection procedure among his Unusual trading days, choosing Wednesdays is

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[18] ███ Supplemental Report, ¶ 10.

[19] Marais Rebuttal Report, ¶¶ 18-20.

[20] Dr. ███'s price charts focus on the wrong quantity in any case – whether or not the price of XRP exceeded some arbitrary point is not relevant for whether returns were affected or not by the Ripple news.

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facially not related to Ripple news.[21] I have implemented this thought experiment by applying Dr. ████'s methodology of removing abnormal returns to Unusual Wednesdays, and compared the resulting price series to his "but-for" prices. Figure 2 below is based on Dr. ████'s Figure 4, where he removes the 1-day abnormal returns on Unusual Ripple news days and calculates the resulting would-have-been prices of XRP. He points, based on his own version of this chart, to the fact that the actual price of XRP (black line) is substantially higher than his but-for price of XRP (red line). The figure below demonstrates that removing abnormal returns on Unusual Wednesdays (blue line) produces results very similar to removing abnormal returns on Unusual days that coincide with Ripple news (red line). In other words, one can achieve Dr. ████'s "results" by picking virtually any arbitrary subset of Unusual days and removing abnormal returns on those days. It is obvious that this striking reduction in prices occurs because the selected days are Unusual, not because they coincide specifically with Ripple news or with Wednesdays.

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[21] Two of the 16 Unusual Wednesdays also have Ripple news identified by Dr. ████.

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Figure 1: Based on ▮▮▮   Figure 4: Actual vs. Counterfactual XRP (One-Day Application) Adjusted for Abnormal Returns on News Days and Wednesdays
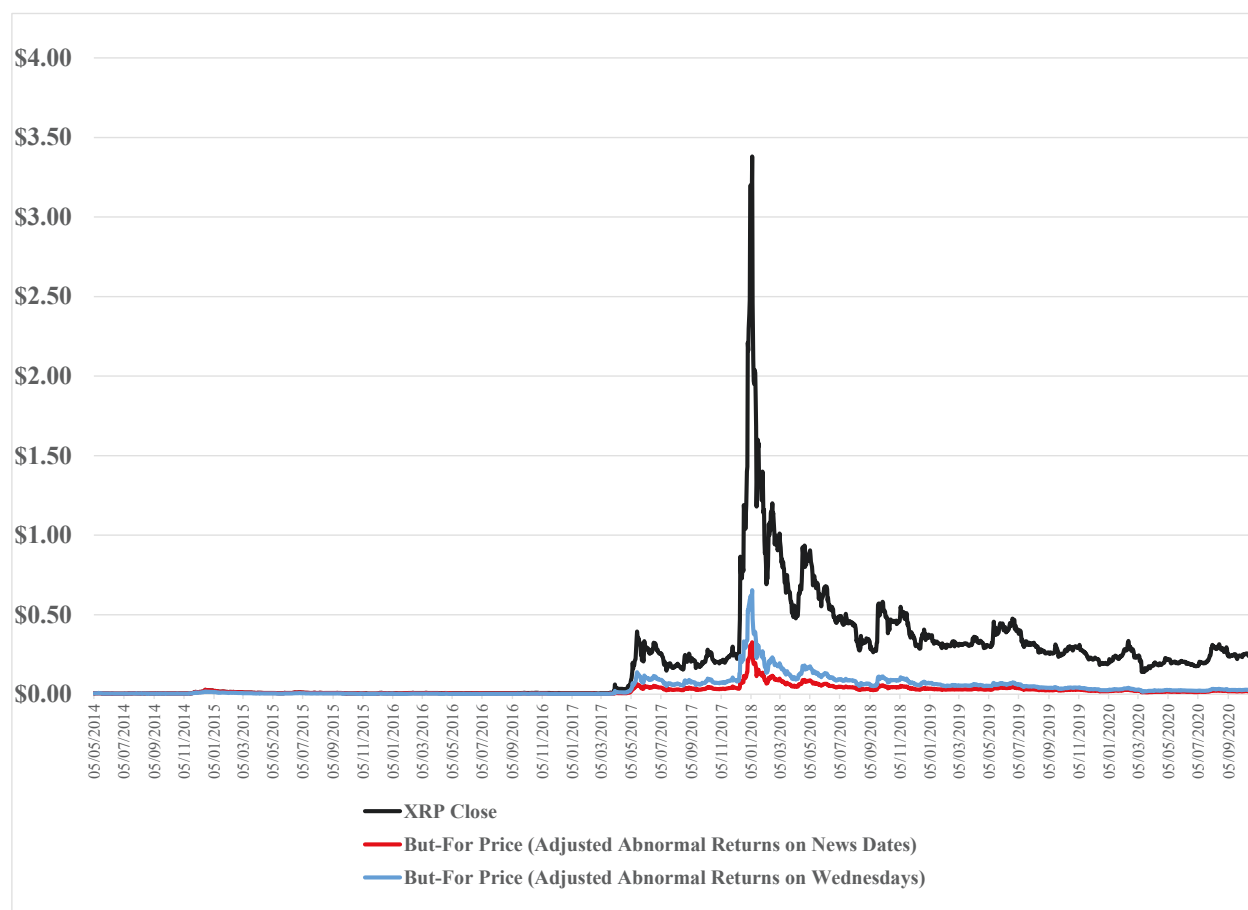

15.   As I explained in my Rebuttal Report, most "Unusual" days are not coincident with "Ripple news" identified by Dr. ▮▮▮.[22] For instance, the excerpt in ¶ 6 above shows that out of 235 Unusual trading days Dr. ▮▮▮'s identified using his Model 1, only 24 coincided with his Select Ripple news days while 211 did not coincide with Ripple news. In fact, I demonstrated that the overall impact of returns on such Unusual-no-news days is much larger than the impact of returns on Unusual-news days Dr. ▮▮▮ chose to focus on. Below I demonstrate that an analogous result holds within Dr. ▮▮▮'s newly introduced would-have-been price

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[22] Marais Rebuttal Report, ¶ 22.

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charts where he selectively removes abnormal returns on some, but not all, Unusual days.

16.   Figure 2 below presents XRP price series after removing abnormal returns on Unusual days that do *not* coincide with Ripple news. As before, black and red lines indicate the actual price of XRP and Dr. █████'s "but-for" price, respectively. The blue line indicates the would-have-been prices of XRP obtained by removing the abnormal portion of the total return on Unusual days *not* coincident with Ripple news. The second panel of the chart presents a magnified image of a portion of the same chart. It is obvious that the "but-for" prices obtained by removing abnormal returns on Unusual-not-news (blue line) days, rather than on Unusual-news days, fall substantially below Dr. ████'s but-for prices (red line).

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Figure 2: Based on ███ Figure 4: Actual vs. Counterfactual XRP (One-Day Application) Adjusted for Abnormal Returns on News Days and Non-News Days

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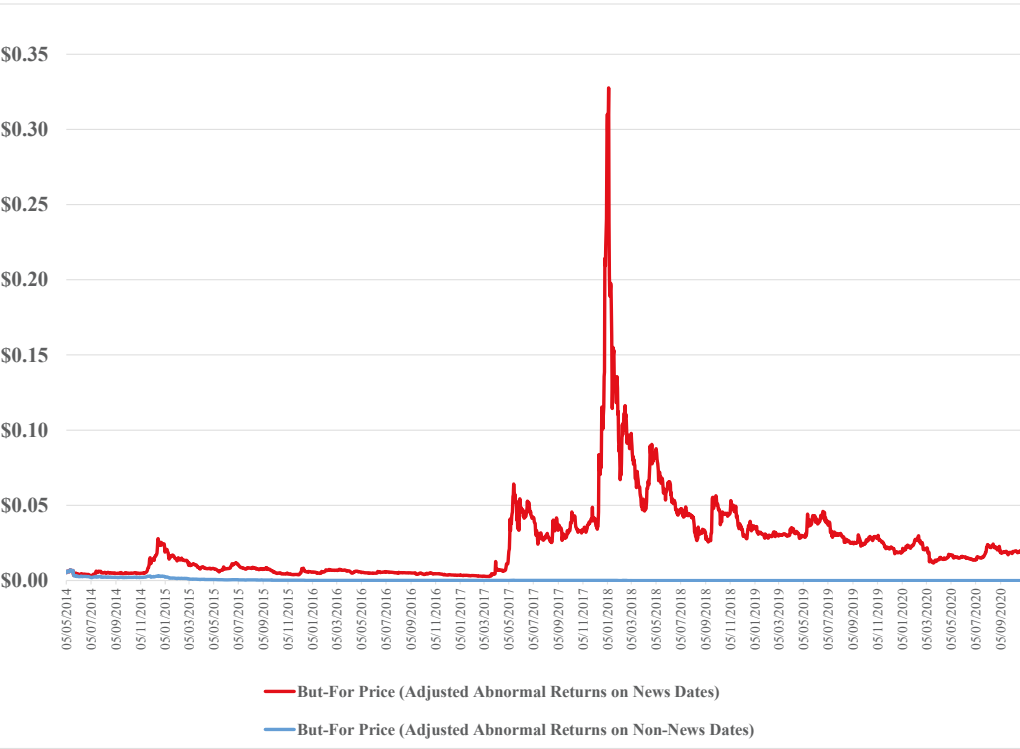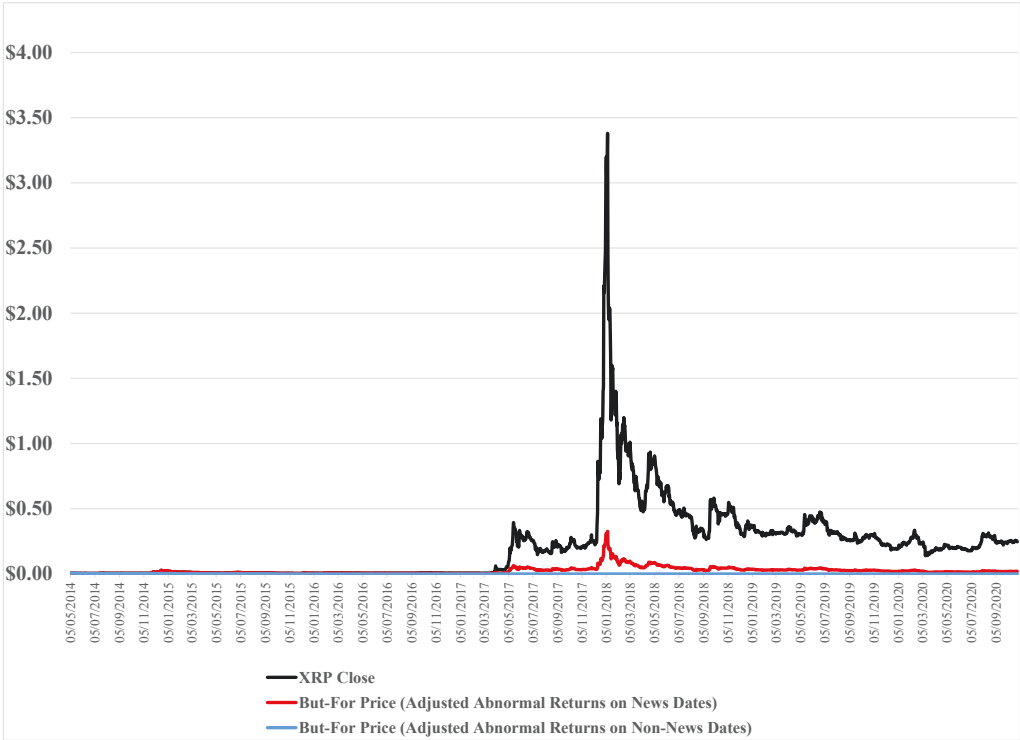
17.   Removal of the abnormal returns components on virtually any arbitrary set of Unusual days is expected to reduce the would-have-been prices; Unusual days are so labeled precisely because prices increased by unusual margins over the expected values (based on Dr. █████'s flawed models) on those days. Therefore, Dr. █████'s novel results in his Supplemental Report amount to a tautology. Moreover, his results do not link abnormal returns to Ripple news generally. Dr. █████ focuses only on Unusual-news days and ignores all remaining Unusual days. Therefore, one cannot draw any conclusions, let alone a conclusion about a specific causal relationship, about any alleged relationship between XRP returns (or prices) and Ripple news based on his new analyses.

IV.   The █████ Event Study Methodology Is Not Designed Appropriately to Provide a Reliable Basis for the Novel Calculations Presented in His Supplemental Report; as a Consequence, their Results Are Flawed and Uninformative

18.   For constructing the hypothetical, would-have-been XRP price series shown in his Supplemental Report, Dr. █████ must replace the observed total XRP return on each trading day with Ripple news with an *imputed* return that would, supposedly, have been observed, but for the Ripple news he identified. This "normal" return imputation calculation is a novel aspect of the █████ Supplemental Report with no clear analog in the █████ Opening Report or my Rebuttal Report. Put differently, this is a novel analysis directed at a novel concept.

19.   Unlike the total XRP returns, which are observed and known with certainty, the portion that is attributable to any news event — including Ripple news — cannot be observed directly and must be estimated. Dr. █████ employs his event study methodology for this purpose. Like any statistical estimation procedure, Dr. █████'s event study calculations are subject to both potential specification error and sampling error. Dr. █████ makes no express allowance for either in the calculations he presents in his Supplemental Report. I show below that his event study approach suffers from substantial statistical uncertainty,

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which renders his approach ill-suited for his calculations. Moreover, the estimation errors are *compounded* in his calculations because he sums portions of returns (estimated with error) over time.

20.   In his Opening Report, Dr. ███ presented a total of 20 distinct regression models for estimating an "expected" XRP return on each trading day, *i.e.*, the return supposedly *expected* to have been observed had no idiosyncratic XRP-specific information — such as Ripple news — affected XRP's closing price on that day. Each regression model is re-estimated for each trading day based on a trailing 180-day estimation period. Dr. ███ does not identify any of his proposed models as a preferred choice, uniquely or otherwise. His different models sometimes imply very different expected return values. For instance, the exemplar news day Dr. ███ chose to use for describing his calculations, May 16, 2017, illustrates this phenomenon.[23] Based on his Model 1, which does not control for *any* factors that might affect the price of XRP, he claims that the abnormal return on that day was a *positive* 23.9 percent, effectively the difference between a total return of 25.7 percent and an expected return of 1.8 percent.[24] However, Dr. ███ overlooks the fact that his other models produce essentially opposite results. For instance, his Model 16, which controls for Bitcoin and Ethereum returns and their lagged values, the lagged value for XRP, and account growth and its lagged value, yields for that same trading day a *negative* abnormal return of -20 percent (the difference between the total return of 25.7 percent and expected return of 45.7 percent). Moreover, Dr. ███ found this negative abnormal return to be statistically significant using his non-parametric approaches. Figure 3 below shows that Dr. ███'s expected returns (blue diamonds) are often above the actual returns (green diamonds), implying negative abnormal returns.

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[23] ███ Supplemental Report, ¶ 11.

[24] Note that these are log-returns and the precise returns are different. In this section, I follow Dr. ███'s convention for simplicity.

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21.   Further, Dr. ████ has not established that any of his 20 alternative models can be used to reliably forecast XRP returns. Many of his regression models result in very imprecise predictions, as measured by the standard errors of the forecasts.[25] Figure 3 below illustrates this issue. In addition to the actual and predicted returns for Dr. ████'s exemplar Ripple news day of May 16, 2017, the figure shows the 95 percent confidence intervals associated with his predicted returns. His parametric two-sided approach would fail to reject the hypothesis that his predicted return is indistinguishable from the actual return for any model in the chart where the actual return (green diamond) overlaps with the 95 percent confidence interval (blue bar). Even for statistically significant returns where the actual return (green diamond) is outside of the confidence interval, the difference between upper or lower bound and the actual return is relatively small. In other words, Dr. ████'s models produce very imprecise estimates. Dr. ████ simply ignores — and in no way accounts for — this statistical uncertainty, which is over and above the specification uncertainty illustrated by the fact that his alternative models sometimes produce markedly differing predictions (see ¶ 20 above).

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[25] A related issue is that some of Dr. ████'s models have no, or almost no, explanatory power as measured by the R2. In other words, some of his models explain close to zero variation in XRP returns observed in the data.

Figure 3: XRP Predicted Log-Returns for May 16, 2017 Based on Dr. ▮▮▮'s 20 Event Study Models
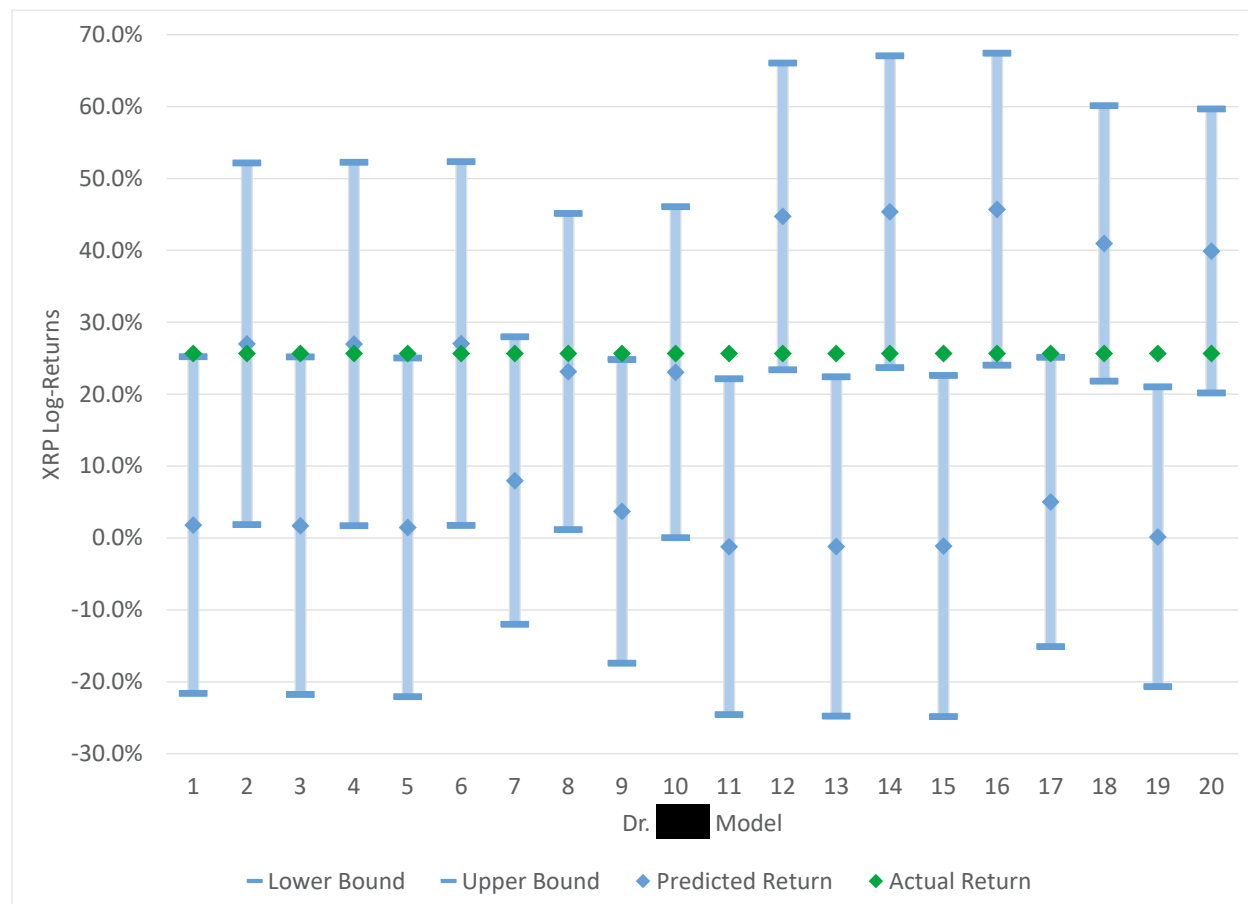
22.   In addition, Dr. ▮▮▮ uses moving (trailing) 180-day estimation windows to predict expected XRP returns on each trading day. Thus, his novel calculation is internally inconsistent in that his estimation windows *include* the Unusual days he previously identified, which are, in effect, the information-driven outlier observations he identified. This jumbling of "normal" observations with outlier observations may affect his results. Dr. ▮▮▮ does not consider or explain what effect the inclusion of such days has on the predictive performance of his regression models.

V.   Conclusion

23.   I hold each opinion expressed in this report to a reasonable degree of economic, mathematical, and statistical certainty. My opinions are based on

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information, data, and analyses of types typically and reasonably relied upon by experts in economics, statistics, and applied mathematics. I may perform further work, and I may supplement this report in light of additional information or analysis. In particular, I understand that I may be asked to assess and respond to any opinions or exhibits offered by the parties at or before a trial in this matter.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 13, 2022.

M. Laurentius Marais

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Attachment A:

Materials Considered

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1. Expert Report of M. Laurentius Marais, PhD, November 12, 2021.

2. Amended Expert Report of ███████████, Ph.D., October 6, 2021.

3. Supplemental Expert Report of ███████, Ph.D., February 28, 2022.